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21 OCT 1999

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22OCT99 E486046-2 D02732
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1. Your reference

A1186

2. Patent application number
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9924959.1

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

7673817001

Mr Ashok Sethi, 33 Harley Street, Lon
W1N 1DA and
Mr Peter Sochor 125 Imperial Dri
Harrow, Middlesex, HA2 7HW

Patents ADP number *(if you know it)*

67112460 01

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

Implant Alignment

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

ABLETT & STEBBING
CAPARO HOUSE
101-103 BAKER STREET
LONDON
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6551001

Patents ADP number *(if you know it)*

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Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

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9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	
Description	7
Claim(s)	2
Abstract	0
Drawing(s)	6

10. If you are also filing any of the following, state how many against each item.

Priority documents	No
Translations of priority documents	No
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	No
Request for preliminary examination and search *(Patents Form 9/77)*	1
Request for substantive examination *(Patents Form 10/77)*	No
Any other documents *(please specify)*	NO

11. I/We request the grant of a patent on the basis of this application.

Signature P. Stebbing Date 21 October 1999

ABLETT & STEBBING

12. Name and daytime telephone number of person to contact in the United Kingdom

GK ABLETT/PJH STEBBING (0171-935-7720)

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IMPLANT ALIGNMENT

The present invention relates to the alignment of dental implants and to a method for their alignment. In the *Probe*, September 1998, I have described a dental implant and a method for its insertion. In this arrangement a site is selected so that it is in the middle of a ridge. The jaw bone is drilled using internally irrigated titanium alloy burs so that it is sited between the labial and palatal cortical plates, making sure that the adjacent teeth and anatomical structures are avoided. The implant is inserted until level with the bone.

Abutment or template selection is effected by using a trial abutment (template) which measures the restorative angle, allows the implant to be positioned to the correct depth, and aligns the driving flat (or hex) in the correct plane.

The trial abutment (template) should fit within the hollow prosthetic envelope. This ensures that the final abutment will be in the right position. Any adjustments to the position of the implant can now be made before it is integrated. The cover screw is then replaced, the wound is sutured and the implant is allowed to integrate over a period of about six months.

The depth to which the implants are placed is important since if they are too deep this may result in bone loss (to the 1st thread) which is not ideal, and if they are not deep enough they may become exposed prematurely. That a trial abutment or template is necessary is shown by the fact that otherwise there is no way that the angle of the abutment can be selected and the plane of orientation measured or changed

unless this is done at the 1st stage of surgery.

In order to achieve this, previously each template was provided with a downwardly depending lug provided with a plurality of driving planes for co-operation with similarly shaped receptor planes in the corresponding bore in which it was adapted to fit. Said "internal hex" arrangements can be satisfactory but give rise to a number of problems. In the first place the internal driving planes have to be small and therefore their manufacture is relatively difficult. However because they can be subjected to significant rotational forces during positioning the manufacturing tolerances must be of a low order. Most of all the utilisation of the internal driving flats, as previously suggested raises the difficulty that the dentist cannot be sure that the template is fully "home" on the implant, which can give rise to misalignments once full implant integration has occurred.

The need therefore exists for a template which will drive the implant during rotation only if the template and the implant are fully engaged. Further there is a need to ensure that the turning moment applied by the template to the implant is as positive as possible.

According to the present invention there is provided an apparatus for the alignment of a dental implant, said apparatus comprising an implant comprising a generally axial blind bore and a plurality of angled templates each adapted for operative inter-engagement with the bore of the implant;
characterised in that each template comprises a locator lug for inter-engagement with the axial bore of the implant,

said lug comprising a circular cross-section. It is preferred that the lug shall have a frusto-conical section for inter-engagement with a corresponding bore in the implant (or taper-lock). In a further embodiment the frustro-conical section includes a plurality, preferably four, of driving planes for co-operation with the bore of the implant. It is also preferred that the frusto-conical section terminates towards its free end in a portion of a smaller diameter.

Alternatively the locator lug may be of a right cylindrical configuration and a plurality of driving planes are provided internally of the body of the template for operative interconnection with a corresponding set of driving flats positioned about the mouth of the bore of the implant.

In an alternative arrangement the locator lug is separate from the template and the template is formed with a bore that is adapted to be co-axial in use with that of the implant.

In a preferred embodiment the template terminates at its intended upper end remote from the lug in a shaft or peg which has a generally elongate configuration, often of a right cylindrical shape, so that whatever its rotational position it will mimic the correct angle of the existing teeth in use.

By means of the present invention the implant will only rotate to its final position when fully inter-engaged. Partial inter-engagement, and hence misalignment of the template with the implant, is thus much less likely to

occur.

The invention will now be described, by way of illustration only, with reference to the accompanying drawings wherein:-

Figure 1 shows a side view from below of a first template of the invention;

Figure 2 shows a side view from below of a final abutment for use with the invention;

Figure 3 shows a side view of the first template in cross-section;

Figure 4 shows a side view from below of another template of the invention;

Figure 5 shows a side view a template somewhat as shown in Figure 1 but with a plurality of driving planes disposed in frusto-conical portion.

Figure 6 shows an exploded side view of a template with a frusto-conical lug in part vertical section;

Figure 7 shows a side view in part section of a template with locking flats to form a external "hex" on the implant;

Figure 8 shows an exploded side view in part section of a template and implant in accordance with Figure 2,

Figure 9 shows a side view part section of the arrangement of Figure 4, and

Turning first to Figures 1 to 4, Figure 1 shows a template comprising a main body which is generally angled to the axis of an implant.

A template alignment shaft 3 and body 4 are angled to the axis of the implant in use by an amount varying from 5° and 45° degrees. The template and the implant are arranged such that they are correctly positionable prior to integration relative to a bore positioned in the jaw by means of the

correct orientation of the shaft 3 relative to the existing teeth in use.

As is shown in Figure 1, the body of the template 1 terminates in generally downwardly depending frusto-conical portion 5 and a right cylindrical extension piece 6. It is arranged that frusto-conical portion 5 and the extension piece 6 are generally co-axial with the bore of the implant 2. As will be appreciated the locking force between the implant and the template is only established when they are fully inter-engaged. A similar arrangement to that shown in Figure 1 is shown in cross-section in Figure 3.

A similar arrangement is shown in Figure 2. In this arrangement the body 4 is provided along its length with an upper most aperture 7, said aperture extending downwardly to terminate at a lower most aperture 8. A bolt (shown generally in Figures 6,7 and 8) passes through the body to locate the template on the implant as necessary. It is desirable that such a bolt should be provided with an Allen keyway for tightening purposes.

Figure 4 provides an alignment shaft 3 similar to that shown in Figure 1 and a body 4, again similar to that shown in Figure 1 with the exception that in this arrangement a rotation aperture 12 is provided through the body 4 in order to locate a rotation rod therein. The arrangement of Figure 4 also provides a downwardly depending locator lug 11 which has a circular cross-section which is in the form of a right cylinder for location in a corresponding bore in the implant.

Figure 5 shows an arrangement similar to Figure 1 but wherein the frusto-conical portion 5 includes a plurality of driving planes 20, but wherein the radially outer edge (21) of the planes 20 has a frusto-conical aspect so that it forms a continuous surface with the frusto-conical portion 5. This allows the template 1 to inter-engage with a co-operating axial bore while also having a positive inter-engagement therewith.

An exploded diagram of the implant and template assembly according to the present invention, somewhat as shown in Figure 2, is shown in Figure 6. In this arrangement, shown in partial cross-section, a threaded bolt 18 is provided with an Allen key aperture 19 and is adapted for location in an upper bolt aperture 7. The shaft of the bolt 18 passes through the frusto-conical portion of the template 5 and through the lower bolt aperture 8.

With the implant and the template fully inter-engaged, the threaded end of the bolt 18 enters a recess 16 in the implant 2. Implant 2 is provided to its exterior with a ribbed edged body 14 terminating towards its upper edge in an annular implant head 13. At its other (lower) end is a cut out 15 for reasons of bone integration.

In use the bolt 18 secured in the aperture 7 passes into the recess 16 and into the screw thread cavity 17, whereupon rotation of the Allen key in aperture 19 causes the template 1 to lock onto the implant 2 in a temporary fashion. The Allen key can then be used to rotate the template 1 into its correct orientation relative to other teeth. The bolt 18 then may be withdrawn without disturbing the implant 2 and the template 1 may be removed and

recorded.

A similar arrangement is shown in Figure 7 but in this instance bolt 18 is provided with standard external driving flats 18', while the template 1 is provided with internal driving flats 10 only.

In Figure 8 there is provided an exploded arrangement showing in part section an embodiment of Figure 3. Its *modus operandi* has been fully described with regard to Figure 6. The only difference lies in that instead of the frusto-conical portion 5, there is provided a plurality of internal locking flats 10 for inter-engagement with an external "hex" 20 secured about the mouth of the recess 16 in the implant 2. It will be appreciated that the effect of the external hex 20 is to locate the body 4 of the template 1 but only when the bolt 18 is fully inter-engaged by means of the Allen key engaged in the aperture 19. Again by means of the Allen key (not shown) template 1 can be placed in its correct position by thereby rotating the implant 2 and subsequently removing the same.

A similar arrangement is shown in Figure 9 which shows the arrangement of Figure 4 in side view and in partial cross-section. The locator lug 11 is right cylindrical and acts to locate the template 1 in position in the implant 2 but of course only once fully inter-engaged. It may then be rotated once the flats 10 have been inter-engaged with the external hex 20 as shown in Figure 8.

Claims

1. An apparatus for the alignment of dental implants, said apparatus comprising an implant provided with a generally axial bore and a plurality of angled templates each adapted for operative inter-connection with the bore of the implant,
characterised in that each template comprises a locator lug adapted for inter-engagement with the axial bore of the implant, said lug comprising a circular cross-section.

2. An apparatus according to claim 1 when the locator lug is integral with the template or is separate therefrom.

3. An apparatus according to either claims 1 or 2 wherein the locator lug is separate from the template and the template is provided with a bore which is adapted to be generally co-axial with the bore of the implant in use.

4. An apparatus according to claims 1 or 2 wherein the locator lug is a frusto-cone having its portion of smaller diameter towards the free end of the lug.

5. An apparatus according to claim 4 wherein the lug comprises an extension piece extending generally axially of the axis of the frusto-cone.

6. An apparatus according to claim 3 further comprising a plurality of driving flats disposed about the mouth of the template bore and adapted for inter-connection with corresponding elements on the implant.

7. An apparatus according to any of claims 4 to 6 wherein the frusto-cone is additionally provided with a plurality of driving flats.

8. An apparatus according to any preceeding claim wherein the template comprises a shaft remote from the locator lug, said shaft has been adapted to mimic the angle of existing teeth when rotated.

9. An apparatus substantially as hereinbefore set forth with reference to, and/or as illustrated in, any one of the accompanying drawings.

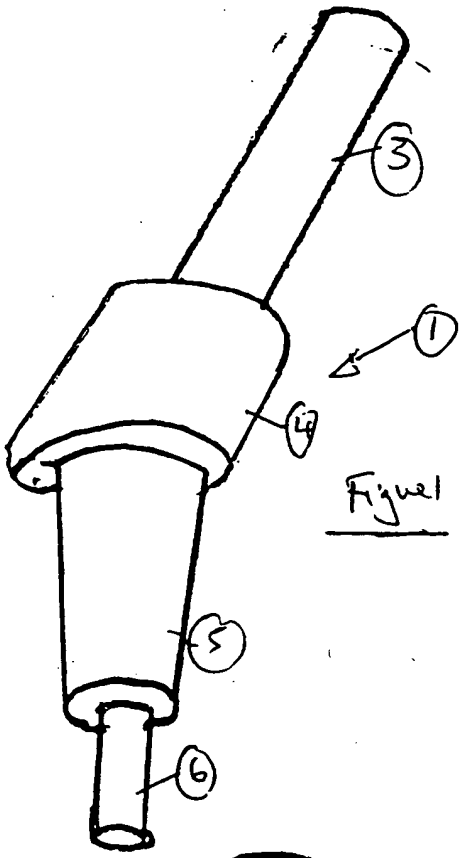


Figure1

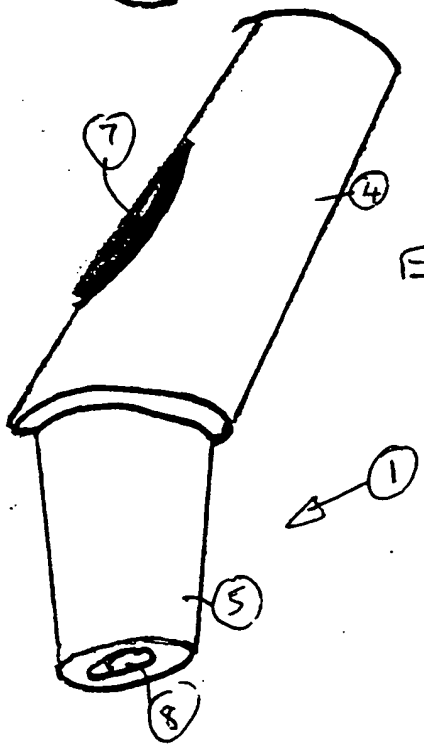


Figure2.

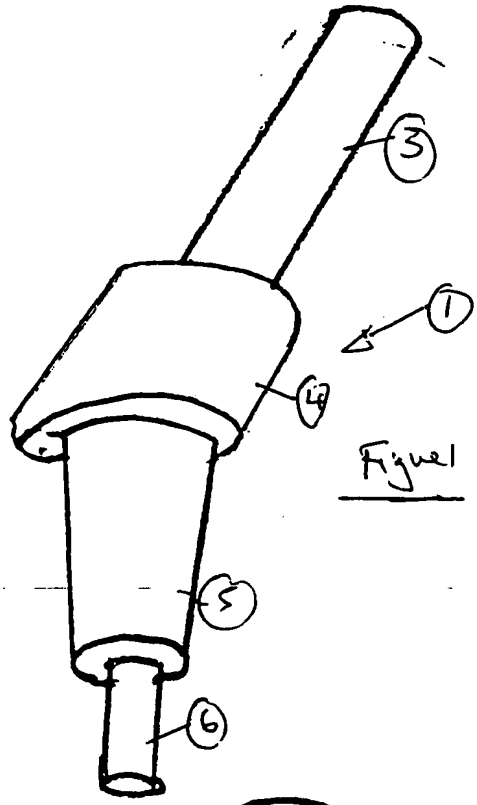


Figure1

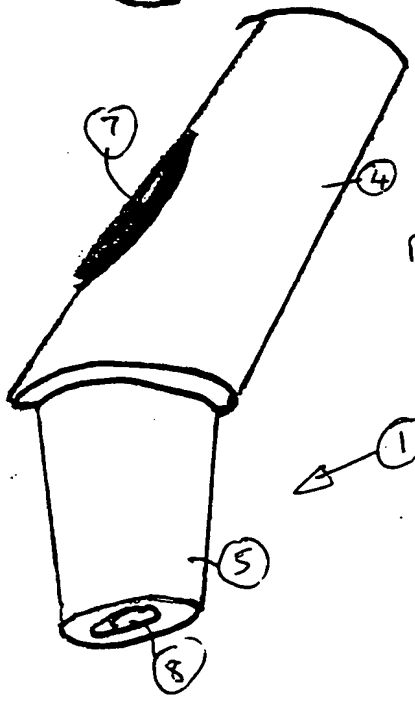


Figure2.

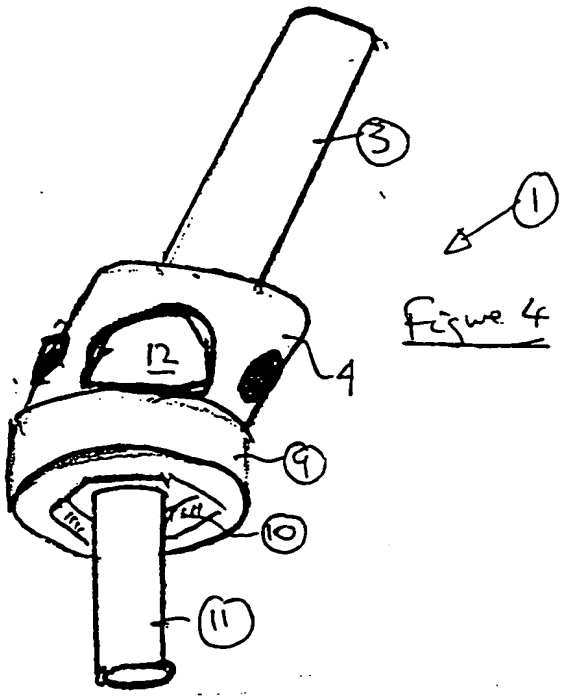


Figure 4

Figure 3.

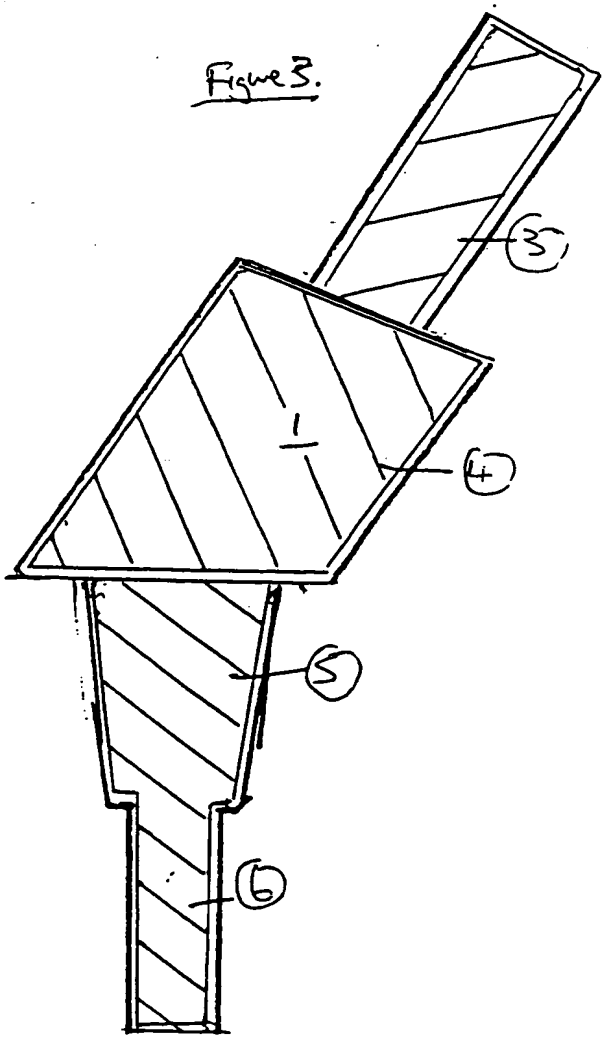
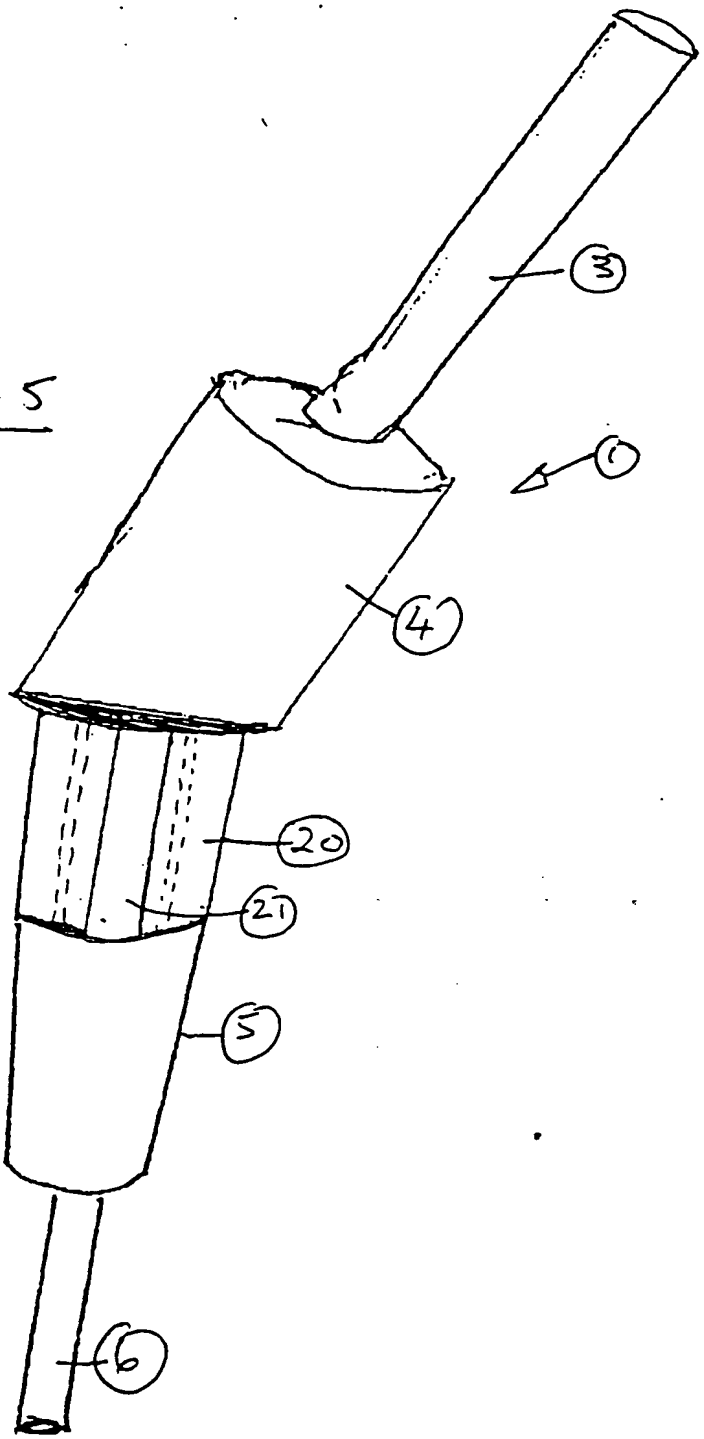


Figure 5



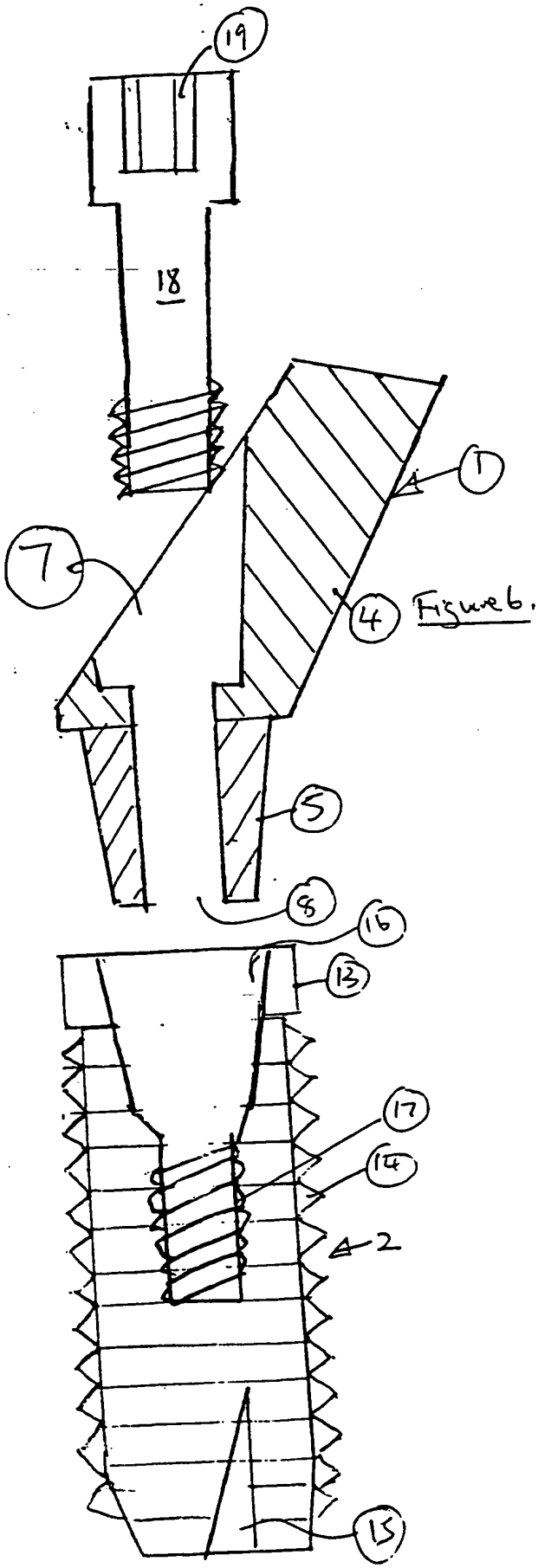


Figure 6.

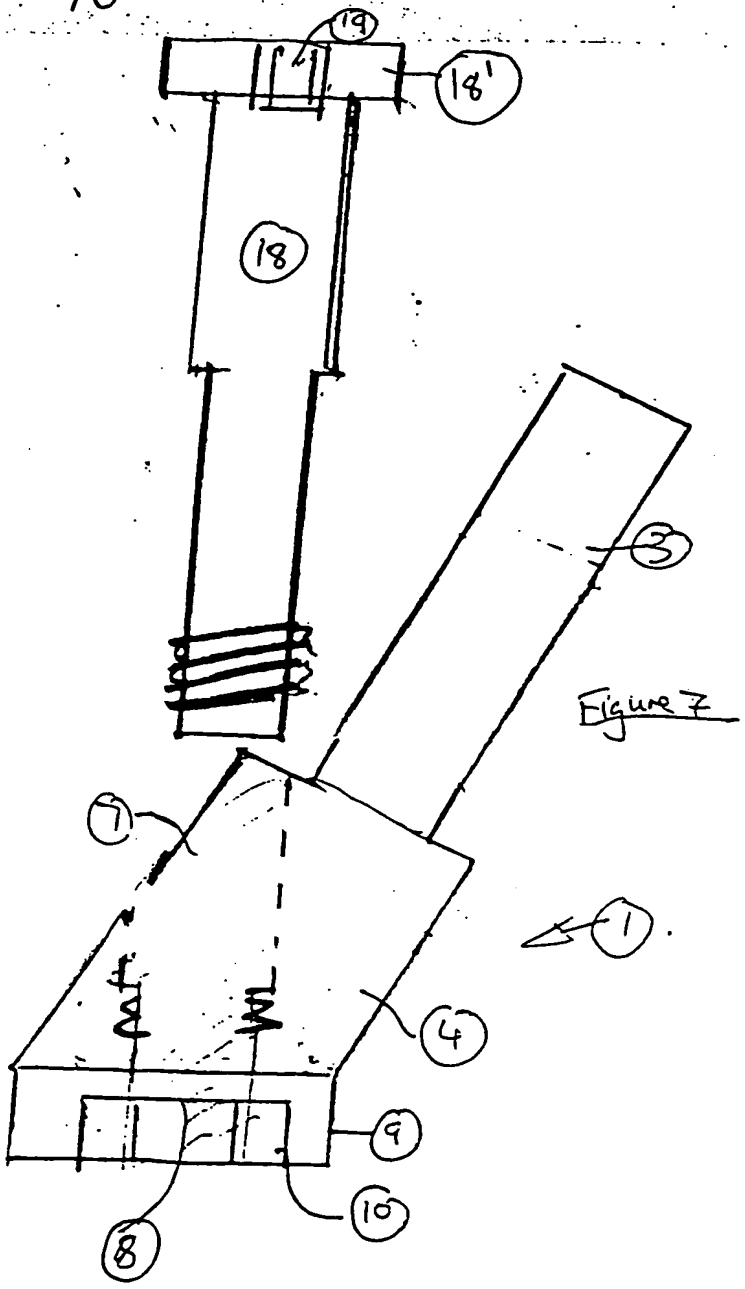


Figure 7

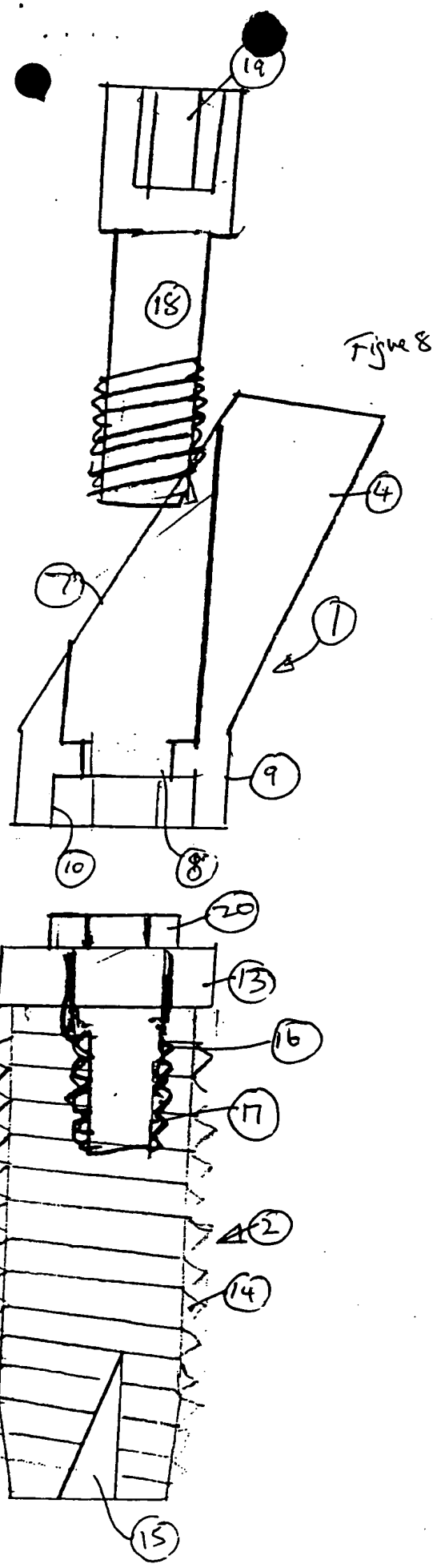


Figure 8

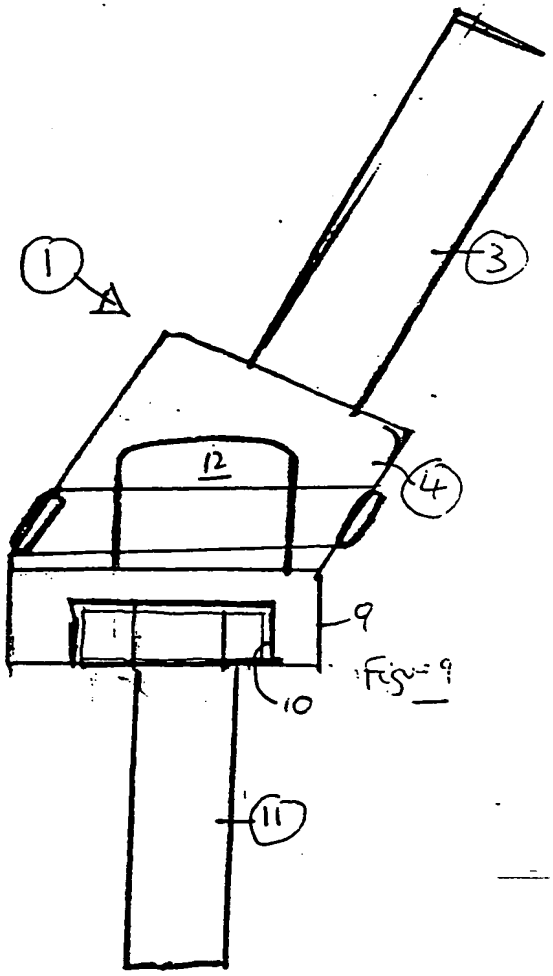


Figure 9